

## WHAT IS CLAIMED IS:

1. A composition to improve bioenergy metabolism of cells comprising two or more chemical substances of Krebs cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors thereof.

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2. The composition according to claim 1, wherein the chemical substances of Krebs cycle are selected from the group consisting of succinate, fumarate, L-malate, and  $\alpha$ -ketoglutarate.

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3. The composition according to claim 1, wherein the chemical substances of Krebs cycle are selected from the group consisting of citrate, cis-aconitate, isocitrate, oxalsuccinate,  $\alpha$ -ketoglutarate, succinyl-coenzyme A, succinate, fumarate, L-malate, oxalacetate, acetyl-coenzyme A and pyruvate.

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4. A composition to improve bioenergy metabolism of cells comprising two or more chemical substances of respiratory chain cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors thereof.

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5. The composition according to claim 4, wherein the chemical substances of respiratory chain cycle are selected from the group consisting of ubiquinone, ubiquinol, heme a, heme b and heme c.

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6. A composition to improve bioenergy metabolism of cells comprising two or more chemical substances of urea cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors.

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7. The composition according to claim 6, wherein the chemical substances of urea cycle are selected from the group consisting of citrulline, argininosuccinate, arginine, ornithine and aspartate.

8. A composition of any one of claims 1-7, further comprising one or two of

biochemical compounds selected from the group consisting of lipoic Acid, lipoamide, acetyl-lipoamide, lysine, carnitine, ascorbate, thiamine, riboflavin, nicotinic acid, niacinamide, pantothenate, nicotinamide-adenine dinucleotide, reduced nicotinamide adenine dinucleotide, nicotinamide-adenine dinucleotide phosphate, reduced nicotinamide adenine dinucleotide, quinolinate, flavin-adenine dinucleotide, reduced flavin-adenine dinucleotide, flavin mononucleotide, reduced flavin mononucleotide, adenosine diphosphate, adenosine triphosphate, guanosine diphosphate, guanosine triphosphate, magnesium ion, calcium ion, manganese ion, copper iron-sulfate and molybdenum.

9. The composition according to any one of claims 1-7, wherein the composition is provided to a human subject in the form of tablets, pills, injections, infusions, inhalations, suppositories or other pharmaceutically acceptable carriers and/or means of delivery.
10. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises two or more chemical substances of Krebs cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors thereof.
11. The method according to claim 10, wherein the chemical substances of Krebs cycle are selected from the group consisting of succinate, fumarate, L-malate, and  $\alpha$ -ketoglutarate.
12. The method according to claim 10, wherein the chemical substances of Krebs cycle are selected from the group consisting of citrate, cis-aconitate, isocitrate, oxalsuccinate,  $\alpha$ -ketoglutarate, succinyl-coenzymA, succinate, fumarate, L-malate, oxalacetate, acetyl-coenzyme A and pyruvate.
13. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises two or more

chemical substances of respiratory chain cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors thereof.

- 5      14.      The method according to claim 13, wherein the chemical substances of respiratory chain cycle are selected from the group consisting of ubiquinone, ubiquinol, heme a, heme b and heme c.
- 10      15.      A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises two or more chemical substances of urea cycle, wherein the chemical substances are intermediates of the cycle and/or precursors and cofactors.
- 15      16.      The method according to claim 15, wherein the chemical substances of urea cycle are selected from the group consisting of citrulline, argininosuccinate, arginine, ornithine and aspartate.

17.      A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| Biochemical Substances  | Amount/Day  |
|-------------------------|-------------|
| Succinate               | 0.01-100 mg |
| Fumarate                | 0.01-100 mg |
| L-Malate                | 0.01-100 mg |
| $\alpha$ -Ketoglutarate | 0.01-100 mg |

18.      A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| Biochemical Substances | Amount/Day  |
|------------------------|-------------|
| Pyruvate               | 0.01-100 mg |
| Acetyl-Coenzyme A      | 0.01-100 mg |
| Citrate                | 0.01-100 mg |

|                    |             |
|--------------------|-------------|
| Cis-Aconitate      | 0.01-100 mg |
| Isocitrate         | 0.01-100 mg |
| Oxalsuccinate      | 0.01-100 mg |
| 2-Oxo-Glutarate    | 0.01-100 mg |
| Succinyl-CoenzymeA | 0.01-100 mg |
| Oxaloacetate       | 0.01-100 mg |

19. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| <b>Biochemical Substances</b> | <b>Amount/Day</b> |
|-------------------------------|-------------------|
| Coenzyme Q-10 (Ubiquinone)    | 0.01-20 mg        |
| Ubiquinol (Ubiquinol)         | 0.01-20 mg        |
| Heme a (Part of Cytochrome a) | 0.01-20 mg        |
| Heme b (Part of Cytochrome b) | 0.01-20 mg        |
| Heme c (Part of Cytochrome c) | 0.01-20 mg        |

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20. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| <b>Biochemical Substances</b> | <b>Amount/Day</b> |
|-------------------------------|-------------------|
| Citrulline                    | 0.01-100 mg       |
| Argininosuccinate             | 0.01-100 mg       |
| Arginine                      | 0.01-100 mg       |
| Ornithine                     | 0.01-100 mg       |
| Aspartate                     | 0.01-100 mg       |

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21. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| <b>Biochemical Substances</b> | <b>Amount/Day</b> |
|-------------------------------|-------------------|
| Lipoic Acid                   | 0.01-100 mg       |

|  |             |
|--|-------------|
| Lipoamide (Lipoic Acid + Lysine)                   | 0.01-100 mg |
| Acetyl-Lipoamide                                   | 0.01-100 mg |
| Lysine   | 0.01-100 mg |
| Carnitine  | 0.01-100 mg |
| Ascorbate  | 0.01-200 mg |
| Thiamine   | 0.01-10 mg  |
| Riboflavin   | 0.01-10 mg  |
| Nicotinic Acid                                     | 0.01-10 mg  |
| Niacinamide  | 0.01-10 mg  |
| Pantothenate                                       | 0.01-10 mg  |
| Nicotinamide-Adenine Dinucleotide (NAD)            | 0.01-10 mg  |
| Reduced Nicotinamide Adenine Dinucleotide (NADH)   | 0.01-10 mg  |
| Nicotinamide-Adenine Dinucleotide Phosphate (NADP) | 0.01-10 mg  |
| Reduced NADP (NADPH)                               | 0.01-10 mg  |
| Quinolate (NAD/NADP precursor)                     | 0.01-10 mg  |
| Flavin-Adenine Dinucleotide (FAD)                  | 0.01-10 mg  |
| Reduced Flavin-Adenine Dinucleotide (FADH)         | 0.01-10 mg  |
| Flavin Mononucleotide (FMN)                        | 0.01-10 mg  |
| Reduced Flavin Mononucleotide (FMNH <sub>2</sub> ) | 0.01-10 mg  |
| Adenosine Diphosphate (ADP)                        | 0.01-10 mg  |
| Adenosine, Triphosphate (ATP)                      | 0.01-10 mg  |
| Guanosine Diphosphate (GDP)                        | 0.01-10 mg  |
| Guanosine Triphosphate (GTP)                       | 0.01-10 mg  |
| Magnesium (Mg <sup>++</sup> )                      | 0.01-10 mg  |
| Calcium (Ca <sup>++</sup> )                        | 0.01-10 mg  |
| Manganese (Mn <sup>++</sup> )                      | 0.01-10 mg  |
| Copper   | 0.01-10 mg  |
| Iron-Sulfate                                       | 0.01-10 mg  |
| Molybdenum   | 0.01-10 mg  |

22. A method for improving bioenergy metabolism of cells, comprising the step of administering to a human a composition which comprises:

| <b>Biochemical Substances</b> | <b>Amount/Day</b> |
|-------------------------------|-------------------|
| Succinate                     | 100 mg            |
| Fumarate                      | 100 mg            |
| L-Malate                      | 100 mg            |
| A-Ketoglutarate               | 100 mg            |
| Pyruvate                      | 100 mg            |
| Acetyl-CoA                    | 100 mg            |
| Citrate                       | 200 mg            |
| Cis-Aconitate                 | 100 mg            |
| Isocitrate                    | 100 mg            |
| Oxalsuccinate                 | 100 mg            |
| 2-Oxo-Glutarate               | 100 mg            |
| Succinyl-Coenzyme A           | 100 mg            |
| Coenzyme Q-10 (Ubiquinone)    | 20 mg             |
| Ubihydroquinone (Ubiquinol)   | 20 mg             |
| Arginine                      | 100 mg            |
| Carnitine                     | 100 mg            |
| Lysine                        | 100 mg            |
| Ascorbate                     | 200 mg            |
| Thiamine                      | 10 mg             |
| Riboflavin                    | 10 mg             |
| Nicotinic Acid                | 10 mg             |